

NESTING HABITS OF *Ectemnius scaber* (LEPELETIER AND BRULLÉ)
(HYMENOPTERA: CRABRONIDAE)

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Abstract.—*Ectemnius scaber* (Lepeletier and Brullé) was found nesting in a dried flower stalk of parsley (*Petroselinum crispum* Nyman). A single entrance hole was made 30 cm above ground level. Five cells, each provisioned with *Toxomerus marginatus* Say (Diptera: Syrphidae), were constructed above the entrance point. This is the first report of the genus as a host for *Ectemnius*. The biologies of seven species of Nearctic *Ectemnius* and three Holarctic species are reviewed.

Key Words: Hymenoptera, Crabronidae, Syrphidae, *Ectemnius scaber*, *Toxomerus marginatus*

The genus *Ectemnius* Dahlbom comprises 184 species worldwide (Pulawski 2005) of which 27 are Nearctic (Bohart and Kimsey 1979). Species are known to provision their nests with adult flies and nest in decaying and rotten wood, pithy plant stems, or in the ground (Tsuneki 1960, Court 1976, Takumi 1999, Pulawski 2005).

In this paper I present new nest information and prey records for *Ectemnius scaber* (Lepeletier and Brullé) for which no previous documented records have been published. Although Krombein (1979) listed a record as “nests in pine” this record remains unsubstantiated and is almost certainly incorrect based on direct observations presented below. In addition to these observations I present a review of the biology of Nearctic species based on the comprehensive overview of Sphécidae given by Pulawski (2005).

METHODS

Nest material was collected in my garden on 29 August 2004 in Silver

Spring, Montgomery County, Maryland. While cutting the vertical, spent flower stalks of parsley (*Petroselinum crispum* Nyman) I noticed a quantity of white, powdery “sawdust” on the leaves of one plant. I found an entrance hole in one stalk. I cut the stem at the base and took it to my lab the following day. After slicing the stem vertically I took a series of digital photos using a Nikon Coolpix 90 camera. The stem halves were taped together and placed in a cardboard rearing container with the lid replaced by a black funnel to which was attached a clear plastic vial. The container was placed in the refrigerator at 40°F (4.5°C) until mid-March 2005 at which point it was removed and placed next to an interior window. Two adult female wasps emerged into the rearing vial on 18 April.

Identification of reared adult wasps was made using Bohart and Kimsey (1979) and comparison with specimens in the collection of the National Museum of Natural History. Voucher specimens of the wasps have been placed in that museum.

RESULTS

Nest structure (Figs. 1–3).—The nest entrance, 3 mm in diameter, was located about midway up the 60 cm drying flower stalk, and about 4.5 cm below a branching point (Fig. 2; stem removed, stub visible). The inner wall of the stem was lined with a thin layer of irregular pith abutting the outer wall. Five cells were found in linear fashion, all built above the nest entrance. The section of stem with cells was about 6–7 mm in diameter with a central hollow core about 4 mm in diameter. The topmost cell was about 16 cm above the entrance (Figs. 1, 3). From top to bottom the cells consisted of three prepupae in cocoons, one larva spinning a cocoon, and one feeding larva (Fig. 3). The two larvae nearest the entrance indicate that the wasp worked from the top down. The venter of the lowest cell (most recent) was about 4.5 cm from the entrance. I could not determine if the nest had been completed, but the space from the most recent cell to the entrance was empty indicating that more cells could have been constructed in the stem.

Each completed cell (Fig. 3) contained (top to bottom) a pith plug (white), a compressed mass of intertwined fly pieces (black), a cocoon (brown) or larva (white), and an empty gap before the next pith plug. No meconia were seen. The measurements for each cell are: pith plug = 10–12 mm; fly mass = 2–3 mm; cocoon 8–10 mm or larva 8–9 mm; gap 5–6 mm. The total cell length varied from 20 to 30 mm. Two cocoons were suspended from the top of the cell but the topmost cocoon was disturbed when the stem was cut and thus is at the bottom of the cell in Fig. 3. Based on the orientation of these bands it appears that the fly prey are placed in the cell after the pith plug is made. Placement of an egg with respect to the prey is unknown for *Ectemnius scaber* because no eggs were found.

Adult emergence.—Adult emergence appears to be from the top of the stem downward and out the entrance hole as there were no other exterior exits and the pith plug above the topmost cell was not breached. The plug beneath had been burrowed through.

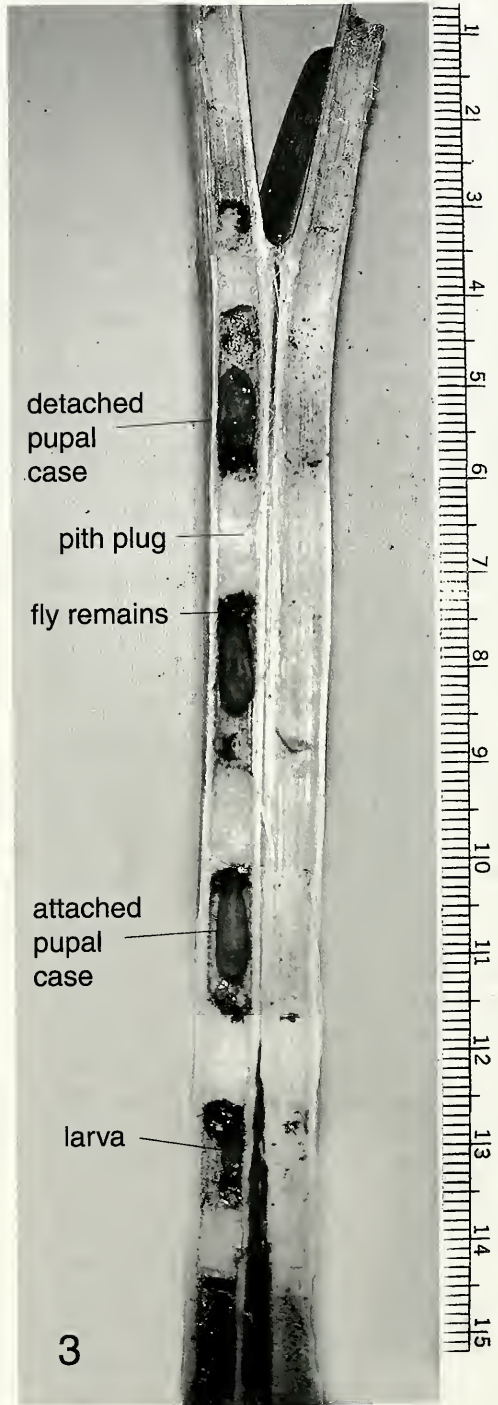
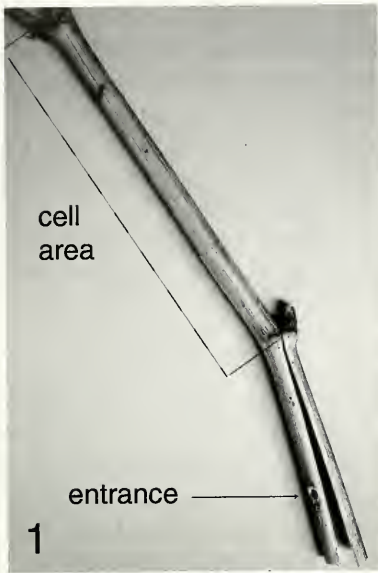
Host.—Prey were identified as *Toxomerus marginatus* Say (Diptera: Syrphidae).

DISCUSSION

The above description disagrees with that of Krombein (1964) for *Ectemnius paucimaculatus* in that the cell construction and lay out (his figs. 7a, 7b) appear to be the exact reverse of *E. scaber*. I am confident about the orientation of the stem in my Figs. 1–3, and those of Krombein appear to be correct as well, so perhaps the differences are distinctive of the species.

Krombein (1964) noted that for *E. paucimaculatus* the wasp egg was laid on the first provisioned fly, whereas Hook (1982) found that for *E. centralis* the egg was laid on the last provisioned fly but that the prey were then rearranged with that fly placed farthest into the cell. With *E. scaber* the fly remains are compressed against the top of the cell which might indicate that it feeds upon the flies from below pushing their remains upward as it feeds and creating a gap between itself and the bottom pith plug. This seems rather odd but fits the cell construction pattern.

Among Nearctic species, only two have been reported using syrphids as prey. *Ectemnius spiniferus* Fox, which normally provisions with acrocerid flies, was found to have a single syrphid prey in one cell (Bechtel and Schlinger 1957), and *E. maculosus* (Gmelin) had prey listed as “syrphids” with no additional data (Krombein 1963b). Three Palearctic species are known to use syrphids as prey: *E. cavifrons* (Thomson), *E. confinis* (Walker), and *E. sexcinctus* (Fabricius),



Figs. 1-3. Parsley stem nest of *Ectemnius scaber*. 1, Stem above entrance hole, area of cell construction indicated by dashed line. 2, Entrance hole. 3, Cross section of stem, rule in mm.

as is the Holarctic species *E. lapidarius* (Panzer) (summarized by Pulawski 2005).

Because there is little available literature pertaining to the biology of Nearctic *Ectemnius*, I present a summary of what is known, drawn from the world catalog of Pulawski (2005).

Ectemnius atriceps (Cresson): Evans (1957: figs. 91–94) described and illustrated the larva collected in a *Sambucus* stem. Krombein (1963b, as *Ectemnius brunneipes* (Packard)) reported this species nesting in logs.

Ectemnius centralis Cameron: Hook (1982) reported this species nesting in a broken, dead limb of live oak (*Quercus* sp.), which he characterized as decaying. Each wasp created side burrows branching off a central nest burrow. These side burrows contained 1 or 2 cells arranged linearly. Prey consisted of flies in the families Stratiomyiidae, Bomblidae, Sarcophagidae, Muscidae, and Tachinidae.

Ectemnius excavatus (Fox): Krombein (1963b) reported this species nesting in rotten logs.

Ectemnius maculosus (Gmelin): Krombein (1963b, as *Ectemnius singularis* (F. Smith)) reported this species provisioning with unidentified Syrphidae.

Ectemnius paucimaculatus (Packard): Krombein (1964) wrote and illustrated an extensive paper on this species, which is the best known of all Nearctic taxa. It makes linear cells in stems of hibiscus (*Hibiscus militaris* Cavanilles). The number of cells varied from 1 to 13 below the entrance and from 1 to 8 above the entrance. Ninety-nine percent of the prey consisted equally of Agromyzidae (*Melanagromyza diantherae* (Malloch)) and several species of Ephydriidae (*Notiphila carinata* Loew; *Hydrellia* spp.). Additional families each represented by a few specimens included Dolycopodidae, Otitidae, Lauxaniidae,

Lonchaeidae, Sciomyzidae, Sphaeroceridae, and Muscidae. Evans (1964: fig. 113) described and illustrated the larva of this species based on material from Krombein's study.

Ectemnius stirpicola (Packard): Evans (1957: figs. 85–89) described and illustrated the larva. Later he added a few additional notes to his description (Evans 1959). Krombein (1963b) listed this species (as "*stirpicda*," a lapsus) nesting in twigs and preying on small acalyptrate muscoid flies.

Ectemnius spiniferus Fox: Bechtel and Schlinger (1957) reported this species nesting in dead or dying twigs of elderberry (*Sambucus coerulea* Rafinesque). Each wasp created a single, linear burrow with up to 6 cells. Prey consisted mostly of Acroceridae (*Ogcodes eugonatus* Loewe) but there were also a few Anthomyiidae (*Hylemya* sp.), and a single Syrphidae (*Sphaerophoria* sp.). A large number of Phoridae (*Megaselia* sp.) were present, but these appeared to be scavengers and not prey.

The following species are Holarctic taxa for which there is minimal data in the Nearctic:

Ectemnius continuus (Fabricius): Krombein (1963a) reported this species nesting in a rotten pear limb. There were seven or eight cells which presumably were arranged in a linear burrow. Prey consisted of Diptera in the families Calliphoridae, Tachinidae, Sarcophagidae, and Muscidae, each being represented by few individuals. The larva was described and illustrated by Evans (1964: fig. 114) based on material from Krombein. The species also was reported nesting in logs by Krombein (1963b).

Ectemnius dives (Lepelletier and Brullé): Krombein (1963b) listed this species nesting in logs, timber, and stems. It provisioned with muscoid flies.

Ectemnius lapidarius (Panzer): Krombein (1963b) reported this species nesting in rotten wood and provisioning with unidentified Syrphidae and Anthomyiidae.

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